Agricultural Value Chain Analysis Tools and Methods

Sidra Majeed (Corresponding Author)
Senior Scientific Officer, Social Science Research Institute,
National Agriculture Research Center Park Road, Islamabad
Email: sidramajeed72@gmail.com
Sumia Binte Zaman
Senior Scientific Officer, Social Science Division,
Pakistan Agriculture Research Council Islamabad
Muhammad Dawood Ur Rahman
MSc (HONs) Scholar Department of Economics and Agricultural
Economics PMAS-Arid Agriculture University Rawalpindi

Abstract
Value chains vary significantly within and across sectors due to their dynamic and diverse systems, which are influenced by social, cultural, temporal, spatial, and commodity-specific factors. Consequently, no single methodology can comprehensively analyze all value chains, and the choice of methodology depends on the objectives and preferences of the analyst. The literature offers various tools and methods for investigating different phases of value chains, often employing a combination of qualitative and quantitative approaches or focusing on one of them. This study emphasizes qualitative methods for agricultural value chain analysis, highlighting survey/interview techniques for data collection and value chain mapping as a widely used data analysis method. A comprehensive overview of the tools and methods used in agricultural value chain analysis has not been previously undertaken. This study aims to address this gap by reviewing the available literature on methodologies, tools, and techniques for data collection and analysis in agricultural value chains. Through an extensive review of guidelines, manuals, reports, discussion papers, and articles, this study identifies key tools and exemplifies their applications in agricultural value chain analysis. Additionally, it synthesizes diverse perspectives from various authors regarding the use of these methods and tools. This review provides a critical contribution to the field, particularly in the context of Pakistan, where such studies are scarce, offering a foundation for future research and practical applications in agricultural value chain analysis.
Keywords: Agricultural Value Chain, Value chain methodology, Data collection methods, data analysis methods, value chain guideline, and value chain methods

1. INTRODUCTION

There are various definitions of value chain analysis (Donovan et al. 2015) used definitions in three groups i.e. activity based, actor based and

network based. Activity based definitions pose no restriction on the type of chain relationships e.g. (USAID, 2012) defines value chain as "The study of value chains comprises of two key concepts: value and chain. The term value is synonym to "value added" in the Value Chain Analysis as it characterizes the incremental value of a resultant product produced from processing of a product. For agricultural products, value addition can also take place through differentiation of a product based on food safety and food functionality". Price of the resultant product shows its incremental value. The term chain refers to a supply chain indicating the process and the actors. Similar definitions are formulated by various sources (World Bank 2010; FAO 2013; Kaplinsky and Morris 2000 and IFAD 2010).

On the other hand actor based definitions highlight actors e.g. Bernet et al. (2006) defines a value chain as "all the actors, and the entirety of their productive activities, involved in the process of adding value to a specific crop or product". Definitions comparable to Bernet is presented by UNIDO 2011 and Sanogo 2010). However Network based definitions focuses on networks e.g. (Sanogo 2010), describes market arrangement as a "multi-player, multi-function arrangement comprising three main sets of functions (core, rules, and supporting) undertaken by different players through which exchange takes place, develops, adapts, and grows". Other explanations similar in nature are offered by (DFID 2008 and Lundy et al. 2007).

Concept of value chain analysis underwrite to pro-poor growth. Pro-poor growth theory formulates that economic growth is directly related to success of poor people which ultimately lead to mollify the delinquent of poverty. If poor people participate in product markets, e.g. food markets, labor intensive activities, it may uplift people out of poverty (Hobbs et al. 2000). It is useful to conduct value chain analysis in the scenario of entrepreneur development, augmentation of food excellence and protection, the amount of value accumulation, up gradation of corresponding relationships between manufacturers, processors, retailers and progress of single business's market competitiveness (GTZ 2007). Kaplinsky and Morris (2000) established that the sphere of production and exchange is multidimensional and dissimilar. Value chains are different from each other within and between sectors. The difference in value chains also pertains at local and national level. Therefore solitary methodology cannot be applied on every value chain. Every methodology of conducting value chain analysis will have its unique features and significance according to the situation and can only be evaluated though amalgamation of different tools and methods.

Essential theoretical and procedural fundamentals of value chain analysis are still developing. Different experts have interpreted value chain analysis differently (Donovan et al. 2015). Value chains are multifarious systems in constant flux and heavily entrenched in various social/cultural sceneries, which in turn greatly effects the application of value chain interventions which are time, space and commodity specific (FAO 2007 and

Ton et al. 2011). However; ILRI (2014) established that dynamism in value chains are hardly ever explored. i.e. evaluation of the certain value chain in two different time periods e.g. past and present along with formation of primary relationships. In different studies the application of value chain analysis is done through different methodology. The choice of the tools is dependent on the value chain analyst (Fabe et al. 2009 and Nang'ole, et al. 2011).

Diverse tools and notions are presented in literature to examine various features of value chains e.g. earnings division, ecological effect of chain actions, division of rule or the blow of obstruction to entrance. Different methods deal with different objectives. Each tool has its distinctive purpose of relevance. Value chain analyses are carried out by using both qualitative and quantitative schemes and either of them (Mayoux 2003). Researchers have strong penchant for the use of qualitative data. In this study qualitative methods are focused. Nevertheless any consolidated review on use of various tools of value chain analysis is not available in literature (Fabe et al. 2009 and ILRI 2014). This paper is an attempt to cover the missing space in the literature and presents a qualitative systematic review on the approaches and methods used in the different manuals and will help readers to understand the alternative methods and approaches available so far. This paper summarizes recommended practices for data collection and data analysis of value-chain studies. In assessing tools and methods the proceeding discussion extracts this information across different guides.

2. METHODOLOGY OF REVIEW

Qualitative systematic review methodology is used to conduct this study that assimilates or equate the results from qualitative studies. According to Rich et al. (2009), it compares ideas or hypothesis from different qualitative studies. This kind of review may employ purposive sampling being the non-probability sampling that is designated on features of a population and the objective of the study (Rich et al. 2009 and Grant and Booth 2009). This study is based upon different available guidelines and manuals designed to conduct value chain analysis. Moreover, various reports, briefings, discussion papers and articles related to value chain analysis are also included in this review. The review has been carried out by searching material from internet. Screening of more than 100 studies is made on the subject. Different key words were used to search the relevant papers e.g. Value chain manual, value chain tool, value chain guideline, value chain handbook, and value chain methods etc. In this study data collection and data analysis methods have been extracted from different guides and manuals.

3. DISCUSSION

In this section tools and methods suggested by different guides and manuals used to conduct agricultural value chain analysis for data collection and analysis are discussed. Qualitative research methods are widely used in

the field of social sciences in order to explore the social associations, and report actuality as practiced (Ashley 2016). There is no specific condition upon which qualitative methods should be used. The decision of using qualitative and/or quantitative tools depends on many factors: 1) qualitative research is preferred in case of limited time and budget as data on prices and quantities is also available in secondary sources such as national statistics. 2) Researchers want to investigate the responses in order to overcome variation in responses to ensure the reliability of information with various cross checks. 3) Warranting an elevated level of legitimacy and steadfastness is main apprehension in social science research approach (Legesse 2014).

Data collection methods in agricultural value chain analysis

The data collection methods for agricultural value chain analysis are many. Most commonly used methods are discussed following along with possible merits and demerits:

Review of existing secondary sources of information

Reviewing the already available material on subject value chain could be a valuable source of information for instance statistical data and material being the source of evidence for production phases, supply and processing capacities, prices, size and rate of transactions and consumption, statistical annual report, past studies, academic research documents, newspaper articles, government reports, and analysis from trade connotations and reports from international organizations, donors and NGOs etc. It will also uncover general information of a more qualitative nature (Bernet et al. 2006 and GTZ 2007). Hellin and M. Meijer (2006) has also pointed out a limitation in the value chain studies done by the practitioners of value chain i.e. usually many project designers don't spend time in gathering the secondary information and may end up in resource wastage. The reason behind could be the monetary benefits associated with fieldwork. USAID endorsed that review of existing secondary sources of information must be taken earnestly as there is a lot of information available on various value chains carried out around the globe.

Proponents of this method plead that review of secondary information may lead to avoidance of duplication of work and might come up with worthy acquaintances that could help in gathering field data effectively Hellin and M. Meijer (2006). The greater the quantity of facts and data interviewer holds prior to the conversation with interviewee, more well-organized data collection procedure will be. It will also facilitate in formulating the early verdict that will result in making the checklist for the information gaps along with in depth knowledge in a various issues (GTZ 2007).

While opponents have reservation that there may not be guarantee of quality of data therefore its origin must be checked. Moreover in secondary data review, quantity must not be taken identical to relevance. It may be the case that the information has been generated to answer the different research

questions or objectives. For example data may be collected many years ago or for different population (USAID 2008).

Saunders (2011), used the desktop research and obtained quantitative historical data from secondary sources while conducting value chain study on meat, fruit, vegetables and dairy sectors of Bosnia and Herzegovina. Other studies that have used the tool of review of existing secondary sources of data and information are (Anteja 2012; Atetwe 2016; Reddy et al. 2010; Heifer International 2013; FAO 2012; IICA 2016; Karimov 2016a).

Rapid Appraisal (RA) method

There are different names for rapid appraisal method and used interchangeably i.e. rapid rural appraisal, participatory rural appraisal, rapid assessment and rapid qualitative team based research etc. (Karimov 2016b). According to Beebe (2005) and Taylor (2005) rapid appraisal method is usually used when there is shortage of human resources, funds, time and other resources and intense data collection is not required unlike detailed value chain analysis. Moreover rapid appraisals are used to determine the scope of the project. Taking into account these confines, Taylor (2005) amended rapid rural appraisal techniques and Collins, and Dunne (2007) to rapidly analyze supply-chain systems in Pakistan, tagging the new method as 'rapid supply-chain analyses. In order to adapt to the shifting use of terminology, the new method was termed as 'rapid value-chain analyses. GTZ (2007), Suggested that formal and informal means of data collection may be used for conducting value chain analysis or combination of both can also be used. These means can start from mere evaluation of secondary sources and data to carry out laborious or probabilistic survey, discussions, communal consultations, exit balloting, transect walks, focus groups, mini surveys, mapping of the target population, group debates, consumer service surveys, and direct observation etc. A set of means that lies between these ranges is rapid appraisal methods. Rapid appraisal methods are specifically striking for applied research studies (Collins et al. 2016).

Proponents of rapid appraisal method consider it a time efficient tool for collection of information. Moreover in comparison to in depth surveys it is low in cost. It may assist in collecting data, investigate, and report desired information for relevant stakeholders within short period of time which is otherwise not possible (GTZ 2007). Rapid appraisal method is powerful ingenerating information needs concerning insights, concerns, assessments and approaches of participants. There is a great importance of qualitative opinions about performance drivers because they create an impact on the actions and business interactions of chain participants.

However a contrasting view point is that the results from rapid appraisals cannot be considered for the larger population, broad analysis and impact evaluations. The reliability and legitimacy of the rapid appraisal methods are usually low compared to the in depth value chain analysis. In order to

strengthen validity of the results obtained through rapid appraisal method multiple means and careful groundwork must be used to ensure the validity of results. Otherwise data may be considered as biased and inaccurate (Collins et al. 2016).

This methodology has been used by USAID (2010) for the appraisal of value chain of apricot for Gilgit-Baltistan in Pakistan. This study used already available secondary data. And information gaps were filled by field visits through interviews with apricot farmers, traders, processors and exporters. Interviews of apricot traders were carried out in Islamabad. USAID (2012), conducted Participatory Rapid Horticultural Appraisal for horticulture and livestock in agri-business project in Karachi. This work was carried out by using secondary and field data for horticulture sub-sector. It covered 50% of districts by randomly selecting the settlements/villages within each cluster/region. Around 2-3 focus group dialogues were conducted in respective district containing 10-15 representative of sample sub-sector. Time series data for district wise area and production was arranged for the past ten years. Other studies include (USAID 2013; GIZ 2015 b; Schut et al. 2015; IICA 2016; and. Karimov 2016a).

Rapid Market Appraisal (RMA)

This method has been used with different names e.g. Market assessments, rapid assessments for markets (Hichaambwa and Tschirley 2006; Ferris 2012 and ICRC 2014).This method delivers swift, supple and operational way of gathering, handling, and evaluating information and data about markets and marketing structures. Based on the outcomes of rapid market analysis interventions and policies can be proposed for stimulating production for the development of business plans of the clients (Hichaambwa and Tschirley 2006).

Market assessment approaches are variable and include the group of activities to reach the final conclusion (World Bank 2010). For instance secondary research for sectors growth, and to obtain necessary information for government rules and policy, group dialogues facilitate in seeking more specific information, detailed interviews for qualitative and quantitative evidences to understand complementary relationships. Market Observations are required to acquire data from markets on transactions, relations, practices, and rooted amenities and cross-checking is required to corroborate the obtained information. Interactive workshops are also used to validate previously gathered information and to conclude a consensus for solving hitches in the chain between the actors.

Hichaambwa and Tschirley (2006), preferred this tool because it can provide a quick overview of certain market for a given product or service in certain area along with past and present trends of market development. It can be an information source for the growth potential of the local, regional and export markets and also useful to suggest the interventions and strategies by

government and non-governmental agencies. It can also guide for constraints and opportunities confronted at several stages and investigate the reasons for low performance of marketing system. That can further be used to reshape the policy, investment decisions, harmonization among actors in the chain, and to suggest intervention to benefit large number of producers in low value products and lesser number of producers in higher value products.

However the other view point is laid down by Ferris (2012) who considers that RMA tool needs to deliver its conclusion speedily and timely. Essentially there are many limitations on resources, time, human resource and past & present data availability. In this scenario the quality of data collection will likely to suffer. Moreover RMA examine short term sequencer verdicts. However market situation can change expressively even in short term. Information collected through RMA may have restricted shelf life as markets are dynamic. There may be further needs to collect data for the market evolution.

Hall (2016), has used RMA to categorize and assess the flow of production and consumption along with challenges and opportunities in agricultural, commodity crops and forestry commodities in Bantaeng and Bulukumba districts, South Sulawesi, and Konawe and Kolaka districts in Southeast Sulawesi Indonesia through rapid market appraisal by using the snow ball approach to identify the relevant agents. Other studies that have used the tool of rapid market appraisal are (Perdana and Roshetko 2012; Itibaev. 2016; DFID 2008; ICRC 2014; Coles 2015; and Sophors and Mengcheang 2009).

Key informant interviews with chain actors

Key informants provide contextual evidences and perceptions for useful resources prior to the execution of survey. Key informant interviews are conducted with individuals having deep market knowledge (World Bank 2010). According to USAID (2008) key informant interviews can be an imperative tool for collecting data for value chain analysis. Key informants are those individuals who have extensive information of a specific market chain; and can be a source of information about market function, costs, trends, problems, and opportunities. Most experienced individual should be interviewed. According to GTZ (2007), evidences must be collected from entire chain from beginning till end. In case the chain is not clustered and need to be examined in totality then national and international areas must be visited to gather the relevant data. Key informant interviews can assist framing the market issues prior to the market survey and may be worthy foundations for interpreting data collected through other sources and for cross checking of information (Webber and Labaste 2010) .

The supporters of this tool are of the view that key informant interviews make available profound perceptions on explicit substances keeping in view the individuals perspective and experiences (USAID 2010).

Key informant can facilitate in formulation of the recommendation for value chain analysis that can mend the chain enactment (Webber and Labaste 2010). Employing key informant interview method provide tractability which allows the interviewer for discovering hidden issues and firsthand information that interviewer/researcher might have ignored otherwise and can be documented in reference to the information provided by key informant. This method is low cost compared to in depth interviews easy to handle and can be conducted informally (Webber and Labaste 2010 and Collins et al. 2016)

However USAID (2008), highlighted the limitation that is a risk of biased selection of the interviewee by the researcher/team. There may be the chance that the key informant may not tell the exact truth or the interviewer may hear different versions of the truth. However the interviewer needs to cross check the information by comparing the responses of several actors at one point in time, and at different stages to validate the prior information e.g. price data obtained from secondary sources and validate through primary data.

Heifer International, has used the tool of key informant interviews for the goat value chain from the key persons having specialized information about the goat raising, trading, health technicians, and relevant knowledge. Other studies which have used this tool are (Legesse.2014, Heifer International 2013; USAID 1996; Okia et al. 2020; and Umberger 2014).

Structured direct observations

Direct observation tool may be used to gather qualitative and quantitative data from local businesses on business exchange, collaborations between actors, procedures, and allied services. Observations are modest instrument to validate responses acquired from varying sources (Bernet et al. 2006). The direct observation approach is used casually carried out simultaneously with key informant interviews; during data collection groups visit farming field or a processing unit, and gather firsthand information regarding physical infrastructure e.g. roads, buildings, equipment, etc. or the on the spot progressions e.g. Activities done, managerial practices, nature of the transactions taking place, sales practices, confirmation of prices from traders, logistical arrangements, investigation about the real use of quality standards and rankings may also be collected. Moreover the practice of monitoring, evaluation, regulations and controls can be directly investigated throughout the chain. The investigation group may use the chance to communicate with participants of chain may or may not be key informants; however lengthening variety of opinions and standpoints are obtained (GTZ 2007).

GTZ (2007), supported the use of this tool because it is used for supplementing other tools e.g. interviews and secondary data analysis. Research group may obtain valued discernments and appreciative regarding operations of certain chain by using direct observation approach.

On the other hand opponents consider that there could be a peril of prejudiced verdicts from the bystanders: predetermined concepts, not certainly substantiated by the observation procedure, may shake the real facts. However to overcome this risk team approaches are commended (GTZ 2007). Another striving associated with direct observation tool in agri-food chain studies is the prerequisite to harmonize the execution of value chain research in such a time when the subject activities are actually happening on ground. For example chain investigations related to crops should be done in accordance with the cropping pattern. Research about production, harvesting and post-harvesting activities must be planned according to the respective crop stage.

Reddy (2010), used direct and indirect observations for goat value chain in Nepal by documenting interactions, process or behaviors as they take place e.g. goat sheds, butcher house, live goat markets and transactions etc. Other studies include (Heifer International 2013; Sophors and Mengcheang 2009; Legesse 2014; Ouma et al. 2015 and Meybeck and Redfern 2016).

Surveys/Interviews

Interviews must be done with at least some of the stakeholders of the chain participants. Moreover while steering interviews; interviewer may mark the stakeholder to invite to the stakeholders' workshop to be held in future (if this approach is used). Information obtained from interviews should be inveterate from other sources e.g. other value chain actors (USAID 2008). An ample value chain assessment must include actors from final market (retailers, consumers), value formation functions (traders, producers, processors), service providers (technical and financial), and policy makers (government, business association and others). But numbers of chain players are determined based upon the extent of the chain being assessed.

At this stage scientific sampling is not necessary; however it can be done in collaboration with project team. The interpretations of the research group during the survey aid to confirm and corroborate the facts provided by interviewees. In order to get ready for the stakeholders' workshop short and quick interviews are carried out, reports are compiled, and data is collected and analyzed into a field investigation report. On the other hand the detailed interviews are not only the source of qualitative and quantitative information on the value chain it also helps in understanding the complementary relationships of various actors of chain. Market and consumer surveys are expedient to acquire a truthful depiction of operative features of the market for the product or service (World Bank 2010). This method uses appropriate and well-organized questionnaire to record the respondents view point (Legesse 2014).

Anandajayasekeram, et al. (2009) and Blackstone (2012) favored this approach due to its cost efficacy, generalizability, steadfastness, and resourcefulness. Moreover this method of value chain analysis is advantageous to analyze approaches, opinions, values, comportment and

factual. In case of large number of respondents it can cover plentiful queries to support data analysis and cross checks of information for the validation. However this is not possible in other tools to this extent.

However Blackstone (2012) and Wyse (2012), also shed light on the limitations of this tool i.e. worth of surveys utterly depends on the scheming of questionnaires. If questionnaires are not at par with the objectives of the chain assessment than the consistency of surveys and interviews become dubious because respondent may interpret its meaning differently. For this reason qualitative surveys are not considered as reliable as that of the quantitative surveys and maintain the consistency. Respondents may not feel exhilarated to provide precise, authentic responses or the responses which present them in disparaging manner (Blackstone 2012).

Wyse (2012), Conducted value chain analysis for High value agriculture in Moldova and carried out in-depth firm level and personal interviews from farmers, retailers, wholesaler, government officials, and private service providers.

Millennium Challenge Corporation (2012) Conducted value chain analysis on fresh vegetable market intermediaries in Pakistan and used the tool of surveys from vegetable growers, commission agents, seed dealers. Out of 2000 growers, agents, and dealers operate in the targeted clusters 222 respondents were randomly selected for data collection. Agent and dealer respondents were selected from nine markets; either from one of the eight large wholesale provincial fresh vegetable markets or from the 20 smaller wholesale markets operating within the target clusters. Other studies include (Anteja 2012; Atetwe 2016; Nasir 2015; Reddy et al. 2010; Heifer International 2013 and Okia et al. 2020).

Focus group dialogues with chain actors

Focus group technique is a kind of qualitative research approach, and demarcated as organized dialogue with a group of small number of people, organized by a facilitator by using a certain team, to generate qualitative data on subject of interest, employing a set of open-ended interrogations (FAO 2009). These are steered exchange of thoughts on specified topics during which new queries and perceptions ascend as a consequence of the conversation and envisaged analyses (World Bank 2010 and Bernet et al. 2006). The foundation of the focus group discussion can be traced back in the field of sociology. However it is rapidly used in the marketing studies and across a wide range of sectors. Robert Merton was the first person who first published his study using focus group discussions in social science. Later on this practice was presented by Paul Lazarsfeld and others in marketing (Masadeh 2012). Legesse (2014) Considered focused group discussion as more edifying than the discussion with individuals and it is due to the fact that respondents in the group might have coinciding range of information, and have a chance of more coverage than individuals'

responses. It is dynamic and iterative process rather than set ways and the interview method. One-to-one conversations are needed to overcome the prejudice in development and to contemplate as a farmer or other value chain stakeholder. Decisions regarding farming are not taken by the farmers in segregation and are taken on the basis of social forces and opinions.

Morgan (1996) and Hellin et.al. (2010), considered it a powerful tool as the intersecting range of information provided by the respondents may cover the comprehensive information than from a single person. Focus group discussion documents richness and elasticity in data collection that are not generally accomplished by smearing an instrument exclusively; moreover it maintains the spontaneity of communication between participants.

Freitas, et.al. (1998), considered that a reasonable amount of information can be obtained in a limited time. However truthfulness and spontaneity of respondents cannot be guaranteed. This is having great value due to the fact it is complimented with observation about reality. It allows discovering subject and producing postulates on the theme of the researcher's interest. Data collected through FGDs are having high "face validity" and is minimum cost compared to other methods. On the other hand some other writers opposed the use of this tool on the basis that it is critical to incorporate the heterogeneity present in the viewpoints of participants of FGDs. Minimum 5 respondents per chain per region must be considered as a rule of thumb and this number can be increased by adding few more respondents in case difference between opinions is wide. The Moderator/facilitator can influence the results of focus group discussions. Therefore there is a threat of partiality or personal verdict in the exchange of ideas and may present biased results.

Gibbs (1997), also highlighted the limitation of using focus group discussion as it may be hard in terms of assembling the representative samples because it may deject certain people from contributing in the group discussion e.g. people who are not very articulate or confident, having communication issue, or special needs. It is possible that participants don't trust the moderator and may be cautious about revealing personal/sensitive information and there may also be concerns to maintain the confidentiality.

In Nepal USAID (2011), conducted Value Chain study for off-season vegetables using tool of focus group dialogue in small pockets, with traders, processors, exporters and relevant stakeholders. Moreover market visits interactions with chain actors in the same sector were also used for off-season vegetables (cauliflower, cabbage, onion, cucumber, tomato, and chili).Other studies include (Anteja 2012; USAID 2011; Reddy et al. 2010; Heifer International 2013; USAID 1996 and Umberger 2014).

Data Analysis Methods For Agricultural Value Chain Analysis

There are numerous methods of data analysis for agricultural value chain analysis. Most commonly used are discussed below:

Multi-stakeholder process/ participatory workshops/ stakeholders' meetings

The most important method of data analysis in value chain is participatory multi-stakeholder workshop. In this method all the stakeholders' e.g. producer organizations, traders, retailers, policy-makers and development NGOs of subject value chain are brought on one plate form. It permit important Research & Development organizations to meet the respondents and supplementary actors as a consequences of survey for value chain to converse notions and themes of concern vis-à-vis collaboration for concrete market opportunities. Depending upon the common interest, probable combined prospects are conversed and missing actors are identified (Bernet et al. 2006). Moreover this process may end up in finding an agreed upon methodology to address the issues in market between the chain members (World Bank 2010). In multi-stakeholders' workshop rudimentary data is reported by the tool users to analyze data on different indicators of value chain, different actors for stakeholders discussion, and to make assessment to reach conclusion (Donovan et al. 2015).

The IIED (2008), suggest that this methodology can be used in multiple ways. Diverse groups may be involved in various stages of the process. One method would be that convener may elucidate the overall methodology to a broader group of stakeholders, and later on technical group may conduct detailed analysis on the instruction of convener. Second method is to work through the whole methodology in a multi-day workshop e.g. particular stakeholder group, for instance producers' co-operative, may practice the methodology to cognize their own locus before engaging with others chain actors. Finally, ruling mutual basis between actors is the objective of the entire exercise. However if no mutual basis are created, then the process may not lead to much transformation but only virtuous intentions. It is mandatory to work with members of each group of chain actors in multi-stakeholder workshops. It may be the case that these members may or may not be very good in conveying their verdicts.

Bernet, et al. (2006), recommends interactive workshops as they are useful in validating and confirmation of formerly congregated material. It can produce innovative notions for addressing limitations or prospects in the market. Donovan et al. (2015), ally this tool may lead to common analysis of subjects, using a merging systematic structure that provides a larger chance of finding mutual basis and forming the procedure a real agent of change. The methodology is elastic in terms of how the activities are pooled and sequenced. IIED, 2008 also supported the use of this tool as it is useful in engaging diverse clusters that permits a mutual understanding of problems and openings along the whole value chain. With the help of mutual

understanding and creating trust between different actors in the chain, there are chances for the improvement at levels of the chain.

However USAID, considers the limitations of the analysis as selection of the right participants to yield the favorable results for the stakeholders meeting is the most critical part. If this is not done carefully than goal of keeping the momentum for desired objectives cannot be met. Moreover in case the convener has not paid attention to those stakeholders who have capacity to drive the solutions than the participants won't be able to take ownership of the process. However care should be taken that the per diems are not the only motivation for stakeholders to attend the workshop rather it should be an obligation to elevate the requirement. Usually the discussion in the multi-stakeholder workshops is influenced by the government & NGO representatives and technical experts. However the real actors like traders don't usually get the chance to speak and if they speak they don't discharge the plenty of information and draw too much attention to themselves. If they are involved into discussion they have potential source of insightful information on the level of functioning at their part of the value chain. Participants having low social positions in stakeholder workshops may feel out of place and it may be the case that their ideas may not grab attention of other participants. Very often there is noticeable acrimony or chances of fierceness between different market actors and they become totally dismissive of views of other actors and not likely to change their views. Producers and market actors are involved in busy business cycle (e.g., harvest time) and have to travel long distances to attend the workshop which may not result in fulfillment of commitments.

Heifer International et al. 2013, recommended to use consultation workshop meetings with relevant stake holders of goat value chain in Nepal e.g. goat production experts, meat processors and livestock economists having experience in goat marketing, producers and consumers. Other studies include (FAO 2012; IICA 2016; GIZ 2015 b; FAO 2009; and Tallontire 2011).

Analysis of strengths, weaknesses, opportunities and threats (SWOT)

SWOT analysis is used to pinpoint the principal dynamics affecting the operations of an agricultural value chain. For SWOT analysis obtained information is analyzed in terms of present stimuli (strengths and weaknesses) and probable future expansions (opportunities and threats). This tool decides whether the evidences contribute in an agricultural-food chain success in certain atmosphere, or if it designates impediments that need to be overwhelmed or reduced. The purpose is to deliver facts base to backstop the strategy endorsements in terms of opportunities and threats. Typically external factors to the issue of analysis are considered responsible for opportunities and threats in SWOT analysis. This is primarily workable

for the formulation of enabling environment (policies, trade agreements, etc.). While strengths and weaknesses are associated with internal factors of the object i.e. items related to performance drivers e.g. technologies, inputs or firm management (FAO 2009).

Queensland University (2017), supported the use of SWOT analysis because the cost associated in carrying out SWOT analysis is having little or no cost. SWOT analysis can be easily performed subject to the understanding of value chain. It can be performed in short time period to address a complicated situation. This tool also facilitates in understanding value chain and in bringing the weaknesses in lime light. It intimidates threats and exploits on opportunities. It escorts to take benefit of strengths and determine business milestones and approaches for realizing them. Limitations of SWOT analysis were also highlighted that it is good exercise to ascertain the key issues in the chain but unfortunately it doesn't offer the solutions and alternative decisions. SWOT analysis is just one stage of the business planning development. For composite issues, comprehensive research and analysis may be required to compliment the SWOT analysis in order to reach on certain decision. The major limitation of the SWOT analysis is that it doesn't rank issues and ideas. Studies which used SWOT analysis are (Atetwe 2016; Heifer International 2013; FAO 2011a; Sherazi 2011; and Collins, and Dunne 2007).

Scoring approach

Scoring approach, method is used to evaluate risks on ordinal scales. In this method risks are ranked according to certain set criteria e.g. impact or likely losses. Ranking serve as the foundation to make judgments to address risks. There are two types of scoring techniques i.e. weighted scores and risk matrices (FAO 2007).

FAO, 2007 used scoring approach for chain analysis: Scoring approach consists of three phases.

• The first step is to carefully select the performance drivers and respective establishing elements (the sub-factors') and then evaluation is made for each segment of the chain. Moreover performance driver for enabling environment are also disintegrated into 'sub-factors' and assessed consequently.

• The sub-factors are categorized as per the 'degree of controllability' e.g. factors controlled by firms, & governments, and Quasi-controllable &Non-controllable factors. If the stakeholder is capable to control sub-factors then suitable strategy can be formulated. Analysis should deliver evidences to verbalize plans and policies for better-quality chain performance for firms and governments.

• The influence of each sub-factor on their individual driver is qualitatively assessed through 'likert' scale. The verdict ranges from 'very favorable', for substantial optimistic role of the sub-factor, to 'very unfavorable', for pessimistic roles/barriers to grasp or endure performance. Intermediate

situations are categorized as favorable', 'neutral' and 'unfavorable'. The qualitative scale is then converted numerically into unitary strides ranging from –2, for 'very unfavorable' to +2, for 'very favorable'. Each sub-factor is weighted with a value that designates its capability to impact the performance driver to which it fits to. In fact, each performance driver can be also weighted otherwise, as per its role to the whole chain performance. Last step is to generate 'Drivers Evaluation' that can be obtained by multiplying the value of column 'Relevance' to the column of 'Weight' to provide a complete assessment for each performance driver. Finally the scores of each driver are obtained in total columns.

Scoring techniques are renowned for the ease of its use. The sensitivity analysis can also be carried out easily and trade off can be readily manifested. It permits manifold criteria selection along with financial method for both tangible and non-tangible aspects that are used for approximation and take the decision (Kloppenborg 2014). The weighted scoring model establishes that certain aspects are more significant than the others.

Esar (2000), criticized this approach and suggests that the scoring method pretends fastidiousness and transparency that may not exist in reality. The actual misrepresentation rises due to the transformation of ordinal to cardinal scale for both the scoring and weighing the indicators. The course of scoring and weighing also deliberates the intangible components for the assessment in terms of perception. This is not probable to measure in numbers.

Hubbard (2020), criticized scoring approach in many ways e.g. it overlooks the cognitive biases of the experts who ascribe the scores. There may be influence of biases on the opinion of analyst and may mislead the results. There is high risk of discrepancy in considering qualitative explanations of each score by diverse individuals. The objective definition on how an expert has distinguished between low, medium and high risk is often misplaced. Hubbard argued that altering score to the next score may have lopsided result on the arrangement of risk. For instance on a 5 point scale, 75% of all responses are 3 or 4. Thus changing a score from 3 to 4 or vice-versa can have a disproportionate effect on arrangement of risks that may be deceptive. While using scoring methodology it is often assumed that essentials being scored don't have any correlation and are independent of each other. This postulation has no rationalization and has no evidence. In scoring approach it is expected that the extent of the quantity being assumed is directly proportional to the scale e.g. a score of 2 infers that the criterion being measured would be double for a score of 1. However, it may not be the case in actuality; doctrines are occasionally linear as inferred by such a scale.

The performance scoring matrix was used by (USAID 2013) for the value chain analysis of apricot subsector in Gilgit-Baltistan Pakistan. It used six performance drivers i.e. i) enabling environment, ii) technology, iii) market structure, iv) coordination, v) firm management, and vi) availability

of inputs. Other studies which have used the scoring approach for value chain analyses are (Hubbard 2020; UNIDO 2009; UN 2009; OECD 2015; USAID 2007).

Value chain mapping

Chain maps are the basic of any value chain analysis and are obligatory. They are useful to categorize business processes, functions, chain actors and their relationships along with the chain supporters in a certain chain (Hobbs et al. 2000). FAO (2007), indicated about chain structures at different levels. Chain maps provide an overall impression of assembly of the chain and are made with erratic feature and showcased with variable scheme of activities. The distinctive chain map will have a vertical, or a horizontal assembly, which are classified as 'upstream' activities and functions (input supply, farming activities, etc.) and downstream activities (traders, processors, transporters, wholesalers, retailers).

According to USAID (2007), value chain maps presents the different supply channels that convert raw materials into finished products and then distribute those products in different consumer segments e.g. individual consumers and different markets to which products are sold. For service value chains, the map shows all of those convoluted in providing particular services. The rudimentary maps can be made with the help of information provided by key informants and then afterward polished as more evidences are obtained from other sources. They are very expedient for classifying value chain actors to interview. Hellin and M. Meijer (2006), included the enabling environment (infrastructure and policies, institutions and processes that shape the market environment) and service provision (the business or extension services that support the value chains' operations) into value chain mapping along with value chain actors (inputs e.g. seed suppliers, farmers, traders, processors, transporters, wholesalers, retailers and final consumers).

Saunders (2011), Identified two basic stages for mapping the actors of value chain i.e. (1) an investigation of working groups in chain and (2) investigation within each working group. Initial stage categorizes chain's overall actors with respect to their functionality group (production, post-harvest management, processing, marketing, and provision of business development services), and detect them physically, and collect information of their respective activities. Resultantly, details of actors with respect to their function (people, groups, companies, etc.) will be obtained. By using this information, each functional category is appraised to deal with all actors as one group and is categorized depending upon social, gender, economic, geographic, and technological or other criteria. The diversity of the actors establishes the second step of their identification. Few studies advocated the chain maps because for research planning chain maps are advantageous and serve as a directorial resource (Bernet 2006; Umberger 2014; and Gardner and Cooper 2003). Geographical handling becomes possible through the logical generation of chain maps. It becomes easier to deploy the team of

investigators to estimate the timing and resource needs. The market chain sketch can be used to demonstrate the requirement for improved collaboration throughout certain market chain. Maps are advantageous instrument to classify the actors, product movement, information streams, interactions, problems in the chain and prospects for development etc. A well-constructed map with precise evidences displayed in an understandable manner may augment the environmental skimming procedure. A good map can alert the planners for likely limitations to overwhelm in the system.

However Marrelli (2005), argued that in chain maps sample size to collect information is relatively small which may not represent the inferences for the whole population and process. Data collected though surveys, interviews, and statistical analysis to generate chain maps are often imprecise. Procedure of chain mapping become slanted by biases of experts and may not signify the whole process. Hence the precision of data becomes questionable. Deficiency of appropriate abilities to generate maps with allied details may lead to the mistakes in inferring and positioning data on the maps.

FAO (2012), used value chain mapping in goat value chain in Nepal by identifying the main actors involved in the process, flow of production (milk, meat, and fiber), knowledge and stream of information, volume of sales, relationships between the actors of value chain, constraints and possible solutions. Other Studies that used value chain mapping include (Karimov et al. 2016a; Karimov 2016b; Itibaev 2016; Umberger 2014 and UNIDO 2009).

Triangulation of data

The key challenge in collection of qualitative perceptions' data from key informant is the triangulation. The data needs to be verified. Therefore, it is mandatory to validate data (Legesse 2014). In case the verdict of all the actors seems correct the practice of triangulation facilitates to comprehend the wider scenario of market chain. Triangulation can be assumed as a relation between three or more individuals who are probing the same thing from different perspective. Each individual can comprehend a fragment of the chain, but do not view the scenario in totality. If they are probed to induce that object, three different opinions will be acquired that need to be amalgamated to see the complete image of the entity. Every actor sees the chain with their bias and specific perceptions, and narrates only according to their own situation in the market. However they are partly sightless to the actualities of the other chain actors. In order to see the issue in totality one must triangulate the data and pool all the viewpoints. It is common practice of chain actors to explain subjects that mention to aspects of same problem e.g. producers usually talk about low prices of their produce, on the other hand processors and traders show their concerns about poor quality produce and regular supply. Entire chain actors are referring to similar issue (dearth of information on what to produce, when and how) according to their perspective. While the information obtained from different actors is

matched, interactions are clearer, and way out are obtained that give advantage to the whole chain system, instead of anyone group of actors (Saunders 2011).

Murdock (2017) and Owens (2014), supported the use of triangulation of data because the major benefit of this tool is the verification of the results through multiple methods which ensure the precision and accuracy of the results. Both qualitative and quantitative methods can be used; therefore weakness of one technique will be overwhelmed by the strength of other technique. Majority of sociological researchers grasp partialities which are difficult to evade. Even the data source may inhibit the inherent partialities. Such partialities may cause atypical consequences. However by using triangulation the magnitude of the problem can be reduced. Evaluation from diverse perception offer fuller scenario to be seen and results are enriched having greater cogency and consistency.

However Murdock (2017) highlighted the limitation of triangulation due to its high cost and time. Numerous approaches necessitate massive budget and examining three sets of outcomes require ample time. Statistical evaluation among different the sets add additional coating of time and money. Moreover even application of methodologies cannot be made for smearing triangulation. Variable procedures used to syndicate the results may disturb the authenticity validly and efficacy of the chain studies. Authentication of results is a continuous process and contradictory results may be unavoidable in this process. Struggle of ruling the precise explanation between contradictory results may end up in never-ending process of triangulation.

USAID (2011), used triangulation of data for off season vegetable value chain in Nepal. Data was obtained from different group of actors including farmers, traders, and related stakeholders. Triangulation and validation was made using the obtained information with the help of a private sector dialogue meeting and appraised by experts before concluding the study. Other studies which have used triangulation of data are (FAO 2012; Stein. and Barron 2017; Mwaijande, and Lugendo 2015; Paajanen 2017; and USAID 2009).

Pair wise ranking

This method utilizes a matrix and formulates issues identified in chain and placed in matching columns and rows. Each issue is scored higher in case it appears more than once and allocated a rank based on significance as per its frequency. In order to elucidate the audience each votes for respective issue will be counted and will determine the urgency of issue to be resolved in an order. Resultantly a comprehensive list of priority wise limitations will be obtained (Saunders. 2011).

World Bank (2012) and Pretty (1995), advocated the use of pair wise ranking because it enables to understand the individual perceptions with reference to priority of certain problems and/or preferences. It is the most simplistic way to recognize the collective issues and urgencies. It is easy to

conduct during focus group discussion in short time period to reach the final results, formulate recommendations and decisions. The informal benchmarks of equating possibilities can make it useful for the members of group to contribute verdicts based on their information and involvement.

However World Bank (2012) and Pretty (1995), also underscored the dark side of this tool i.e. it is an intensive exercise in terms of logistic arrangement to manage respective stakeholders on a single platform to rank the issues and urgencies. It may not likely to adhere all the issues obtained through the exercise of ranking and may not be able to support the level of detail sophistication of a multi-criteria analysis. Each participant may use different criteria for doing comparisons World Bank (2012).

FAO 2012 has used the tool of ordinal ranking for the value chain studies of livestock in South and South East Asia in order to support the disease control intervention in livestock along with production system dynamics, product flows and epidemiologic risk assessment during consultative workshop. Other studies include (Sanga et al. 2013; Lundy 2007, Stein. and Barron 2017; UNIDO 2011; Lunt et al 2018; and FAO 2011b).

Problem/fault trees analysis limitations/cause and effect analysis

According to World Bank (2012), fault or problem tree is a step by step process that can be persuasively classify, assess and compute possible reasons for enactment gaps or loop holes in certain system and accordingly formulate recommendation for the prevention of problems.

This analysis identifies the primary reasons of low competitiveness of the market chain and its impacts on producer livelihoods. It is probable that some limitations might be the causes or effects of others. The purpose of fault/problem tree is to formulate the underlying causes to comprehend the basic issues and its causes. Therefore it is desirable to explore the multiple bases for each issue and interaction between them to major extend. Resultantly a clear idea of actual roots of the hitches their consequences and solutions will be generated. After generation of problems tree the connections between limitations is established. Eventually primary bases of subject limitation and its consequential effects are obtained (Saunders 2011).

World Bank (2012), has encouraged the uses of this tool because this technique can be executed for small and large number of participants and hence offers flexibility. The problem tree analysis pursues comprehensive feedback from members to reach the real basis of problem. The evidences acquired from the participants are presented in a logical fashion that makes result more plausible and easy to communicate. The basic purpose of the problem tree analysis is to highlight the functions of the system instead of individuals operating the system. It can be efficiently used for inspection of obstinate and stubborn problems; as such problems are likely to have mutual causes and significant contributing factors.

World Bank (2012), has also highlighted the limitations of this tool e.g. the consistency and precision of the results may be a concern and

bargained as it greatly depends upon the verdict of the other people. If the specious problems are identified in a problem tree analysis then the consequent results may also be misleading or may produce the undulation effect of this error. Results may, also be invalid or imprecise. Problem tree analysis can be relatively time-intensive and complex technique and its application may vary from situation to situation.

FAO (2011b) recommended the use of problem tree analysis. Study was conducted to address the gender inequalities in markets, acquisition of assets, variation in education and worth of income generating actions put an impact on the gender based participation and benefits they obtain from value chain. Other studies that used problem tree analysis are (Muchopa 2013; IICA 2016; Itibaev 2016; FAO 2011b; and Lundy 2007).

4. CONCLUSION

Value chains in agriculture are highly diverse and influenced by a range of social, cultural, temporal, spatial, and commodity-specific factors, making a universal methodology impractical. The choice of methods and tools for analysis depends on the objectives and preferences of the analyst. While a combination of qualitative and quantitative approaches is often employed, this study focuses on qualitative methods, with survey/interview techniques and value chain mapping being the most widely used approaches. By reviewing existing literature and exemplifying the use of various tools, this study fills a critical gap by providing an overview of methods and tools available for agricultural value chain analysis. Such a synthesis is particularly valuable in the context of Pakistan, where comprehensive studies of this nature are scarce. This work contributes to enhancing understanding and providing a foundation for future research and application in agricultural value chain analysis.

5. REFERENCES

1. Donovan, Jason, Steven Franzel, Marcelo Cunha, Amos Gyau, and Dagmar Mithöfer. "Guides for value chain development: a comparative review." Journal of Agribusiness in Developing and Emerging Economies 5, no. 1 (2015): 2-23.
2. USAID. "Participatory Rapid Horticulture Appraisal Report", United States Agency for International Development (2012).
3. World Bank. Building competitiveness in Africa's agriculture: A guide to value Chain concepts and applications. Washington, D.C.: World Bank. http://siteresources.worldbank.org/INTARD/Resources/Building_Competitive ness_in_Africa_Ag.pdf (2010).
4. FAO. Value Chain Analysis for Policy Making Methodological Guidelines and country cases for a Quantitative Approach, EASYPol Series 129, E-ESBN 978-92-5-107664-4, E-ISSN 2219-9497. Food and Agriculture Organization of the United Nations (2013).

5. Kaplinsky, Raphael, and Mike Morris. A handbook for value chain research. Vol. 113. Brighton: University of Sussex, Institute of Development Studies, (2000).

6. IFAD. "Pro-Poor Rural Value-Chain Development" report. International Fund for Agricultural Development. (2010).

7. Bernet, T., G. Thiele, and T. Zschocke. Participatory Market Chain Approach (PMCA): User Guide. International Potato Center (CIP), Papa Andina, Lima, Perú. (2006).

8. UNIDO. Pro-poor value chain development: 25 guiding questions for designing and implementing agro-industry projects. Vienna: United Nations Industrial Development Organization. http://www.unido.org/fileadmin/user_media/Services/Agro-Industries/Pro-poor_value_chain_development_2011.pdf. (2011)

9. I. Sanogo. Market analysis tool-how to conduct a food commodity value chain analysis. World food program and VAM food security analysis. World Food Programmee, Rome (2010).

10. DFID. The Operational Guide for Making the Markets Work for the Poor (M4P) Approach, Department of International Development (2008).

11. Lundy, Mark, María Verónica Gottret, Carlos Felipe Ostertag Gálvez, Rupert Best, and Shaun Ferris. Participatory market chain analysis for smallholder producers. Good practice guide 4. CIAT, (2007).

12. Hobbs, Jill, Ann Cooney, and Murray Fulton. "Value chains in the agri-food sector: What are they? How do they work? Are they for me." Centre for the Study of Cooperatives, University of Saskatchewan, September (2000).

13. GTZ Deutsche. Value Links Manual – The Methodology of Value Chain Promotion. Gesellschaft für Technische Zusammenarbeit (2007).

14. FAO. Guidelines for rapid appraisals of agri-food chain performance in developing countries. Rome: Agricultural management, marketing and finance occasional paper no 20. Food and Agriculture Organization of the United Nations (2007).

15. Ton, Giel, Sietze Vellema, and Marieke De Ruyter De Wildt. "Development impacts of value chain interventions: how to collect credible evidence and draw valid conclusions in impact evaluations?." Journal on chain and network science 11, no. 1 (2011): 69-84.

16. ILRI. Evaluating value chain interventions: A review of recent evidence. ILRI Discussion Paper 26. Nairobi, Kenya: International Livestock Research Institute (2014).

17. Fabe, Anja, Ulrike Grote, and Etti Winter. Value chain analysis methodologies in the context of environment and trade research. No. 429. Diskussionsbeitrag, (2009).

18. Nang'ole, Eddah, Dagmar Mithöfer, and Steven Franzel. Review of guidelines and manuals for value chain analysis for agricultural and forest products. No. 17. Nairobi, Kenya: World Agroforestry Centre, (2011).

19. Mayoux, Linda. "Trickle-down, trickle-up or puddle: Participatory value chain analysis for pro-poor enterprise development." Women In Sustainable Enterprise (WISE) Development mimeo, accessed at www. enterprise-impact. org. uk (2003).

20. Rich, Karl M., Derek Baker, Asfaw Negassa, and R. Brent Ross. "Concepts, applications, and extensions of value chain analysis to livestock systems in developing countries." (2009).

21. Grant, Maria J., and Andrew Booth. "A typology of reviews: an analysis of 14 review types and associated methodologies." Health information & libraries journal 26, no. 2 (2009): 91-108.

22. Crossman, Ashley. Understanding purposive sampling: An overview of the method and its applications. (2018).

23. Legesse, Belayneh. "Research Methods in Agribusiness and Value Chains." School of Agricultural Economics and Agribusiness, Haramaya University (2014).

24. Hellin, Jon, and Madelon Meijer. "Guidelines for value chain analysis." Food and Agriculture Organization of the United Nations (FAO), Rome, Italy (2006).

25. USAID. Participatory market Chain Analysis for Smallholder Producers, United States Agency for International Development. (2008).

26. Saunders, Mark. "Research methods for business students." Person Education Limited (2009).

27. E. Anteja. Competitiveness Assessment of Three Agribusiness Value-Chains in Bosnia and Herzegovina, International Finance Corporation, IFC, Washington, DC USA. (2102).

28. Atetwe, Eleen N. "Value Chain Analysis and Performance of the Kenyan Good Food Company." PhD diss., University of Nairobi, 2016.

29. Reddy, G. P., M. R. K. Murthy, and P. C. Meena. "Value chains and retailing of fresh vegetables and fruits, Andhra Pradesh." Agricultural Economics Research Review 23, no. conf (2010): 455-460.

30. Heifer International. International Goat Association and International Fund for Agricultural Development Goat Value Chain Toolkit, A guideline for conducting value chain analysis of the goat sub-sector. (2013).

31. FAO. Designing and implementing livestock value chain studies – A practical aid for Highly Pathogenic and Emerging Disease (HPED) control. FAO Animal Production and Health Guidelines No. 10. Rome. Food and agriculture organization. (2012).

32. IICA. Commodity systems assessment methodology for value chain problem and project identification, A first step in food loss reduction) Instituto Interamericano de Cooperación para la Agricultura. (2016).

33. Karimov, A. A., Nguyen Thi Thinh, Joseph J. Cadilhon, Hoang Thanh Tung, Dang Thi Hai, Vu Van Doan, and Bui Quang Duan. Value chain assessment report for maize, pig, plum and tea in Son La province of Northwest Vietnam. ILRI (aka ILCA and ILRAD), (2016a).

34. Karimov, Aziz A., Nguyen Thi Thinh, Joseph J. Cadilhon, Truong Tan Khanh, Tran Van Thuy, Chau Thi Minh Long, and Dinh Thi Nha Truc. Value chain assessment report for avocado, cattle, pepper and cassava in Dak Lak province of Central Highlands of Vietnam. ILRI (aka ILCA and ILRAD), (2016b).

35. Beebe, James. "Rapid assessment process." The encyclopedia of social measurement (2005): 285-91.

36. Taylor, David H. "Value chain analysis: an approach to supply chain improvement in agri-food chains." International Journal of Physical Distribution & Logistics Management 35, no. 10 (2005): 744-761.

37. Collins, R. J., and A. J. Dunne. "A rapid supply chain appraisal approach for agribusiness development projects." In II International Symposium on Improving the Performance of Supply Chains in the Transitional Economies 794, pp. 73-80. (2007).

38. Chambers, Robert. "Rapid rural appraisal: rationale and repertoire." Public administration and development 1, no. 2 (1981): 95-106.

39. Collins, R. C., Benjamin Dent, and L. B. Bonney. "A guide to value-chain analysis and development for overseas development assistance projects." (2016): x+-180.

40. USAID. Performance monitoring & evaluation, tips, using rapid appraisal methods. United States Agency for International Development (2010)

41. USAID. Apricot Value Chain Assessment Final Report for the Agribusiness Project, the Agribusiness Project (TAP), Sub Agreement UAP-ISC-012-001-CNFA. United States Agency for International Development (2013).

42. GIZ. Guidelines for value chain selection integrating economic, environmental, social and institutional criteria, German Federal Ministry for Economic Cooperation and Development (BMZ). The Deutsche Gesellschaft für Internationale Zusammenarbeit. (2015 b).

43. Schut, M., L. Klerkx, and J. Rodenburg. "Rapid Appraisal of Agricultural Innovation Systems (RAAIS): A toolkit for integrated analysis of complex agricultural problems and innovation capacity in agrifood systems." no. November 140 (2015).

44. Hichaambwa, Munguzwe, and David L. Tschirley. "Zambia horticultural rapid appraisal: understanding the domestic value chains of fresh fruits and vegetables." (2006).

45. Ferris, Shaun. "A guide to Rapid Market Appraisal (RMA) for agricultural products." Cali, Colombia: CIAT, CRS and Helvetas (2012).

46. ICRC. Rapid assessment for markets: Guideline for an initial emergency market assessment, International committee of Red Cross. International Committee of the Red Cross. (2014).

47. Hall, Samuel. "Comprehensive Market Assessment for Kakuma Refugee Camp." (2016).

48. Perdana, A., and J. M. Roshetko. "Agroforestry and Forestry in Sulawesi series: Rapid market appraisal of agricultural, plantation and forestry commodities in South and Southeast Sulawesi." Bogor (Indonesia): World Agroforestry Centre (2012).

49. Itibaev, Kairat. "Approaches And Methods Of Value Chain Analyses In Agricultural Sector Of Central Asian Countries." (2016).

50. Coles, Christopher, Fredy Mlyavidoga Kilima, Zebedayo Smawel Mvena, Miraji Ngetti, Adam Akyoo, and Carolyne Nombo. "Field assessment of rapid market estimation techniques: a case study of dairy value chains in Tanzania." African Journal of Agricultural and Resource Economics 10, no. 3 (2015): 222-233.

51. Sophors, Y.S. and Mengcheang, N.. Rapid market appraisal on rice of Kompot Province, Cambodia, Cambodian Center for study and Development in Agriculture (2009).

52. Webber, C. Martin, and Patrick Labaste. Building competitiveness in Africa's agriculture: a guide to value chain concepts and applications. World Bank Publications, 2009.

53. USAID. Performance monitoring and evaluation, conducting key informant interviews, USAID center for development information and evaluation. United States Agency for International Development. (1996).

54. Okia, Clement, Judith Oduol, Karl Hughes, Joan Kimaiyo, Patricia Masikati, Fergus Sinclair, Catherine Muthuri et al. "Developing value chain innovation platforms to improve food security in east and southern Africa." (2020): 20220249188.

55. Umberger, Wendy. "Mapping the value chain." In capacity building for Research Workshop, supported by Australian Centre for International Agricultural Research and The University of Adelaide, vol. 1. (2014).

56. Ouma, Emily A., Michel M. Dione, Peter M. Lule, Danilo A. Pezo, Karen Marshall, Kristina Roesel, Lawrence Mayega, David Kiryabwire, Gideon Nadiope, and John Jagwe. "Smallholder pig value chain assessment in Uganda: Results from producer focus group discussions and key informant interviews." ILRI Project Report (2015).

57. Meybeck, Alexandre, and Suzanne Redfern. "Sustainable value chains for sustainable food systems." (2016).

58. Anandajayasekeram, Ponniah, Ranjitha Puskur, and Elias Zerfu. Applying innovation system concept in agricultural research for development. ILRI (aka ILCA and ILRAD), 2009.

59. Blackstone, Amy. "Sociological inquiry principles: Qualitative and quantitative methods." Flat World Knowledge, Irvington, NY, USA (2012): 1753-1794.

60. Wyse, Susan E. "Advantages and disadvantages of surveys." Retrieved February 20 (2012): 2014.

61. Millennium Challenge Corporation. Value Chain Analysis and Market Study in the Fruit and Vegetable Sector in Moldova, Analysis of HVA Constraints, Opportunities and Requirements, USA (2009).

62. Nasir, Mohammad. Baseline report: vegetable market intermediaries in Pakistan. No. AVRDC Publication No.: 15-792. AVRDC-The World Vegetable Center, 2015.

63. FAO. Assessing the Viability of Collection Center for Fruit and Vegetables in Fiji: A Value Chain Approach, AAACP Paper Series No. 7. Food and Agriculture Organization of the United Nations. (2009).

64. Masadeh, Mousa A. "Focus group: Reviews and practices." International Journal of Applied Science and Technology 2, no. 10 (2012).

65. Morgan, David L. Focus groups as qualitative research. Vol. 16. Sage publications, 1996.

66. Hellin, Jon, Jupiter Ndjeunga, and Pippa Chenevix Trench. "Using qualitative market mapping to explore Aflatoxin contamination along the Maize and Groundnut Value Chains." Improving Lives in Africa (2010).

67. Freitas, Henrique, Mírian Oliveira, Milton Jenkins, and Oveta Popjoy. "The Focus Group, a qualitative research method." Journal of Education 1, no. 1 (1998): 1-22.

68. Writing, Alexis. "Advantages and disadvantages of a focus group." Chron Newsletters (2019).

69. Gibbs, Anita. "Social research update, vol. 19." Guildford: University of Surrey (1997): 1-7.
70. USAID. Value chain/ market analysis of the off-season vegetable sub-sector in Nepal, Nepal Economic Agriculture, and Trade Activity, United States Agency for International Development (2011).
71. Badar, Hammad, Anoma Ariyawardana, and Ray Collins. "Capturing consumer preferences for value chain improvements in the mango industry of Pakistan." International Food and Agribusiness Management Review 18, no. 3 (2015): 131-148.
72. IIED. Chain-wide learning for inclusive agrifood market development: a guide to multi-stakeholder processes for linking small-scale producers with modern markets. International Institute for Environment and Development, London, UK, and Wageningen University and Research Centre, Wageningen, the Netherlands (2008).
73. USAID. Guide to Facilitating Stakeholder Workshops, www.microlinks.org. United States Agency for International Development (Unknown year).
74. Tallontire, Anne, Maggie Opondo, Valerie Nelson, and Adrienne Martin. "Beyond the vertical? Using value chains and governance as a framework to analyse private standards initiatives in agri-food chains." Agriculture and human values 28 (2011): 427-441.
75. Queensland University Benefits and limitations of SWOT analysis, Government of Australia (2017).
76. FAO. Gender and agricultural value chains, A review of current knowledge and practice and their policy implications, ESA working paper no 11-05. Food and Agriculture Organization of the United Nations (2011a).
77. Sherazi, S., Paras, G. and Hassan, H. Mid Term review of milk value chain project Vehari, National Rural Support Program (2011).
78. Kloppenborg, Timothy J. "Contemporary Project Management, 2e." South Western (2014).
79. Eser, Thiemo W. "Interactive procedures versus scoring systems for the project selection and evaluation-or-why is the table cloth never big enough?."
80. Hubbard, Douglas W. The failure of risk management: Why it's broken and how to fix it. John Wiley & Sons, 2020.
81. UNIDO. Agro-value chain analysis and development, The UNIDO approach. Agri-Business Development Branch of UNIDO, Vienna, Austria, United Nations Industrial Development Organization. 2009.
82. UN. Guidelines for methodology to support value chains for bio trade products, from the selection of products to the development of sector strategy, United Nations (2009).
83. OECD. Rethinking the value chain analysis, OECD Action paper. Organization for Economic Cooperation and Development (2015).
84. USAID. Value chain program design: promoting market-based solutions for MSME and industry competitiveness U. S. Agency for International Development Office of Microenterprise Development. United States Agency for International Development (2007).
85. Gardner, John T., and Martha C. Cooper. "Strategic supply chain mapping approaches." Journal of business logistics 24, no. 2 (2003): 37-64.

86. Marrelli, Anne F. "The performance technologist's toolbox process mapping." Performance Improvement 44, no. 5 (2005): 40-44.
87. Murdock, Rachel. "Advantages & disadvantages of triangulation design." Retrieved from (2017).
88. Owens, R. Sociology factsheet, Triangulation, Number: 55, www.curriculam-press.co.uk. (2014).
89. Stein, C., and Jennie Barron. Mapping actors along value chains: integrating visual network research and participatory statistics into value chain analysis. Vol. 5. International Water Management Institute (IWMI). CGIAR Research Program on Water, Land and Ecosystems (WLE)., 2017.
90. Mwaijande, Francis A., and Prudence Lugendo. "Fish-farming value chain analysis: Policy implications for transformations and robust growth in Tanzania." Journal of Rural and Community Development 10, no. 2 (2015).
91. Paajanen, Salla. "Opportunities of big data analytics in supply market intelligence to reinforce supply management." (2017).
92. USAID. Gender and Pro-poor value chain analysis insights from the gate Project methodology and case studies, United States Agency for International Development (2009).
93. World Bank. A Guide to Assessing Needs essential tools for collecting information, making decisions and achieving development results (2012).
94. Pretty, Jules N., Irene Guijt, John Thompson, and Ian Scoones. "Participatory learning and action: A trainer's guide." (1995).
95. Sanga, C., S. Tumbo, M. R. S. Mlozi, and F. Kilima. "Stakeholders' analysis using value chain analysis: AHP in action." Interdisciplinary studies on information technology and business 1, no. 2 (2013): 85-104.
96. Lunt, Tobias, Jim Ellis-Jones, Kindu Mekonnen, Steffen Schulz, Peter Thorne, Elmar Schulte-Geldermann, and Kalpana Sharma. "Participatory community analysis: identifying and addressing challenges to Ethiopian smallholder livelihoods." Development in Practice 28, no. 2 (2018): 208-226.
97. FAO. Social analysis for agriculture and rural investment project, Food and Agriculture Organization (2011b).
98. Muchopa, Chiedza L. "Agricultural value chains and smallholder producer relations in the context of supermarket chain proliferation in Southern Africa." International Journal of Managing Value and Supply Chains 4, no. 3 (2013): 33.
99. GIZ. Rapid appraisal of losses in agri-business value chains, Sector project, Sustainable Management of Resources in agriculture The Deutsche Gesellschaft für Internationale Zusammenarbeit (2015 a)